MATERIAL SAFETY DATA SHEET

SRM Supplier: **National Institute of Standards and Technology**
Standard Reference Materials Program
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Gaithersburg, Maryland 20899

SRM Number: 3075
MSDS Number: 3075
SRM Name: Aroclor 1016 in Transformer Oil
Date of Issue: 23 May 2003

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SECTION I. MATERIAL IDENTIFICATION

Material Name: Aroclor 1016 in Transformer Oil

Description: SRM 3075 consists of five 2-mL ampoules, each containing approximately 1.2 mL of a solution of aroclor 1016 in transformer oil.

Other Designations: **Aroclor 1016** (PCB 1016; polychlornated biphenyl (aroclor 1016); chlorodiphenyl (41 % Cl)) in **Transformer Oil** (hydrotreated light napthenic distilltate; hydraulic petroleum oil)

Name	Chemical Formula	CAS Registry Number
Transformer Oil	complex mixture	64742-53-6
Aroclor 1016	complex molecule	12674-11-2

DOT Classification: Not Hazardous under DOT regulations.

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Transformer Oil	99	ACGIH TLV-TWA: 5 mg/m^3 (mineral oil mist)
		Rat, Oral: LD_{50}: greater than 5 g/kg body weight
		Rabbit, Acute Dermal: LD_{50}: greater than 5g/kg body weight
Aroclor 1016	1	ACGIH TWA: 1 $\mu g/m^3$ (skin)
		MEL TWA: 0.1 mg/m^3 (skin)
		Rat, Oral: LD_{50}: 2300 mg/kg
		Rat, Oral: TD_{LO}: 21 mg/kg/21 days (intermittent)

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Transformer Oil	Aroclor 1016
Appearance and Odor: a clear liquid with a mild, bland petroleum odor	**Appearance and Odor:** a clear, oily liquid; odor not available
Relative Molecular Mass: ~ 255	**Relative Molecular Mass:** complex molecule
Specific Gravity: 0.88 g/mL	**Density (water = 1):** 1.36 to 1.37
Boiling Point: ~ 238 °C	**Boiling Point:** 323 °C to 356 °C
Freezing Point: not available	**Freezing Point:** not available
Vapor Pressure (@ 20 °C): < 0.01 mm Hg	**Vapor Pressure (@ 25°C) :** 0.004 mmHg
Evaporation Rate: not available	**Evaporation Rate:** not available
Viscosity (@ 40 °C): 12.0 cSt	**Viscosity (@ 20 °C):** 71 to 81 SUS
Water Solubility: insoluble	**Water Solubility:** very slightly soluble
Solvent Solubility: not available	**Solvent Solubility:** soluble in oils, organic solvents

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this transformer oil/aroclor 1016 solution **DO NOT** exist. The actual behavior of the solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Transformer Oil
Flash Point: 146 °C **Method Used:** COC **Autoignition Temperature:** > 204 °C

Flammability Limits in Air (Volume %): **UPPER:** 7
LOWER: 0.9

Aroclor 1016
Flash Point: >141 °C **Method Used:** Not Available **Autoignition Temperature:** Not Available

Flammability Limits in Air (Volume %): **UPPER:** Not Available
LOWER: Not Available

Unusual Fire and Explosion Hazards: Transformer oil is a slight fire hazard. Heating this material greatly increases the fire hazard. Thermal oxidative degradation may also yield hazardous gases.

Aroclor 1016 is a slight fire hazard.

Extinguishing Media: Use a dry chemical powder, carbon dioxide, or foam. Use a water spray to cool fire exposed containers only. **DO NOT** use a forced water stream directly into an oil fire as this will only scatter the fire; use a smothering technique for extinguishing the fire of this combustible material.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** _____ **Unstable**

Conditions to Avoid: Avoid contact with heat, sparks, flames, or other sources of ignition. Avoid inhalation of vapors or combustion by-products. Avoid contact with the skin. **DO NOT** allow the material to contaminate water sources.

Incompatibility (Materials to Avoid): Transformer oil is a fire and explosion hazard when exposed to strong oxidizing agents.

Aroclor 1016 is incompatible with oxidizing materials and combustible materials.

See Section IV: *Unusual Fire and Explosion Hazards*

Hazardous Decomposition or Byproducts: Transformer oil will produce fumes, smoke, carbon monoxide, sulfur oxides, and aldehydes along with other decomposition products can be produced with incomplete combustion.

Thermal decomposition products of aroclor 1016 may include acid halides, chlorine, oxides of carbon, and halogenated compounds.

Hazardous Polymerization _____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Transformer Oil: The vapor pressure of this material is very low therefore, vapor inhalation under ambient conditions is normally not a problem. However, health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists, or fumes should be minimized.

Prolonged or repeated skin contact with this product may remove skin oils possibly leading to irritation and dermatitis; contact with the eyes may cause eye irritation. Repeated application of mildly hydrotreated oils to the skin of mice induced a moderate incidence of skin tumors. This product has a low order of oral toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

PCB 1016 (Aroclor): PCBs show high levels of bio-accumulation in the fatty tissues with very slow metabolism, especially for pentachloride $(Cl)_5$ compounds and above. The skin lesions consist of small pimples and, in the initial stages, dark pigmentation of the exposed pores. In the later stages, blackheads and pustules develop. The PCBs are potent liver toxins that can be absorbed through the skin in hazardous amounts without immediately discernible pain or discomfort. This liver toxicity of chlorinated biphenyls appears to be increased if there is exposure to carbon tetrachloride at the same time. Where liver damage is extensive, the patient may become comatose and die. The higher the chlorine content of the diphenyl compound, the more probable it is toxic.

Medical Conditions Generally Aggravated by Exposure: Methanol may affect eye disorders, kidney disorders, skin disorders, and allergies. Aroclor 1016 may affect liver disorders, skin disorders, and allergies.

Listed as a Carcinogen/Potential Carcinogen (Transformer Oil):

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs	X	
By the Occupational Safety and Health Administration (OSHA)		X

Listed as a Carcinogen/Potential Carcinogen (Aroclor 1016):

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	X	
In the International Agency for Research on Cancer (IARC) Monographs	X	
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingested, wash out mouth with water. Obtain medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: **Transformer Oil:** skin and upper respiratory tract (URT)
Aroclor 1016: liver

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major spills and/or leaks. Evacuate nonessential personnel. Absorb small spills with sand or other absorbent material and place into containers for disposal. **DO NOT** flush into a sewer. Keep out of watersheds and waterways.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Persons handling this material must wear protective eyewear, clothing, and gloves to prevent contact with this material.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Protect containers from physical damage. Sealed ampoules, as received, should be stored in the dark at temperatures lower than 30 °C. Keep material in a well-ventilated area away from incompatible materials.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Transformer Oil*, 16 December 2002.
MDL Information Systems, Inc., MSDS *Aroclor 1016*, 22 March 2001.
Merck Index, 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.